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MORPHOLOGICAL AND ANATOMICAL STUDIES OF CALOTROPIS PROCERA (ASCLEPIADACEAE) IN IRAQ

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Abstract:

A general and accurate morphological study was carried out for the species Calotropis procera which belongs to the family Asclepiadaceae. The research included the phenotypic characteristics of the root, stem and leaves the leaves were studied morphologically and anatomically, Flowers, fruits and seeds, as well as the geographical distribution of the genus were studied also. In general, there are no previous taxonomic study of this genus under consideration, according to the available sources and it is the first one has been done in Iraq, perhaps Because of its low prevalence previously, where it was recently noticed its spread in last two to three years ago.

Keywords: Apocynaceae, Apple Sodom, Poisonous Plant, Anatomy.

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Introduction:

The Asclepiadaceae family has more than 315 genera and 2,900 species of flowering herbs and shrub vines. It includes a large number of vital medicinal plants found in tropical and subtropical areas, especially in southern Africa and South America, but also in tiny amounts in northern and southeast Asia [1]. In Iraq the plant *C. procera*, also known as Ausher aljin, or the apple of Sodom, it has a milky-white sap, fruit and seed clusters that resemble pods, and silky hairs that may travel enormous distances on the wind and water or in animals [2].

It receives frequent cross-pollination from insects like monarch butterflies. Children differ genetically from their parents (chromosome range 2n = 22; [3]. A study of *C. procera* in its natural environment noted polymorphism in metamorphosis, etc., as well as in flower morphology [4,5]. The species is widely distributed and may be found from Africa north of the equator to the Arabian Peninsula, India, Mexico and America.

The genus name Calotropis is derived from the Greek words calos (beautiful) and tropis (ship's keel), referring to the scales of the plants [6]. The species identify procera is derived from the Latin phrase cera, meaning wax, referring to the leaves [7]. Common synonyms for *C. procera* (Aiton) W.T.Aiton (Asclepiadaceae) are *C.procera* (L.) Dryand., *C. procera* (Aiton) R.Br., C. *heterophylla* Wall., *C. busseana* K Schum, *C. syriaca* Woodson, *C. inflexa* Chiov., *Asclepias procera* Aiton and malformations *C. procera* (Willd.) R. Br. Aiton [8].

FIG. 1: *Calotropis Procera*

Classification

Kingdom: plantae

Division: Magnoliophyte

Class: Magnoliopsida

Order: Gentianales

Family: Asclepiadaceae

Genus: Calotropis

Species: *Calotropis procera* [9].

Distribution:

C. procera is native to tropical and subtropical Africa and Asia, but is extra frequent in the Middle East. It was recently discovered to spread in an accidental manner, both cultivated and wild, in central and southern Iraq. The plant grows in relatively close population groups, due to the large numbers of seeds and ease of dispersal, which makes the spread of the plant in the wild much easier than if the plant grows in individuals and much easier than if its seeds are limited spread. [10]. Also found in West Africa to Angola, North and East Africa, Madagascar, Arabian Peninsula, South Asia to Malaysia [6]. This species is now naturalized in Australia, Indonesia, many Pacific islands, Mexico, and South America, Caribbean islands [11,6] and northeastern Brazil [12,13].

Materials and Methods

C. procera aerial parts were obtained from different area (AlYarmouk, Hay Al Amil, Abo Gareeb, Bab Al Muaadham) *C. procera* grows in home gardens in the city of Baghdad, is wild among Iraqi citizens, and is identified and certified by the Scientific Herbarium (HUB).

The leaves, Flowers, fruits and roots were studied for examination of morphological and micromorphological characteristics.

Fresh leaves were rinsed under running water and samples were cut into pieces containing the midrib and part of the leaf. For subcutaneous sections, 0.05 cm^2 specimens were excised from the midrib portion of the lamina [14]. Photography was performed using a Nikon Labphot 2 microscope unit. Descriptive features match those in standard anatomy books [15,16].

Results:

Calotropis is a tall bushy shrub, the taproot grows up to 4 m long, with spreading lateral roots. Roots form large tubers with a starchy cortex that contains canals full of milky latex, giving roots a spongy texture.

This plant has a grayish- dark green stem, smooth, about 2-4 m. in long, or sometimes it`s grow up to 6 m.

Leaves crossed, obovate, leathery, articulate, acuminate, axillary, umbellate, panicles with purple corolla and erect lobes. Morphological studies show that the leaves are of inferior quality, 6-15 cm long, 4.5-8 cm wide, broadly ovate, ovate-oblong, oval or obovate, acuminate, pubescent when young, both sides when mature Bald as shown in Figure 2.

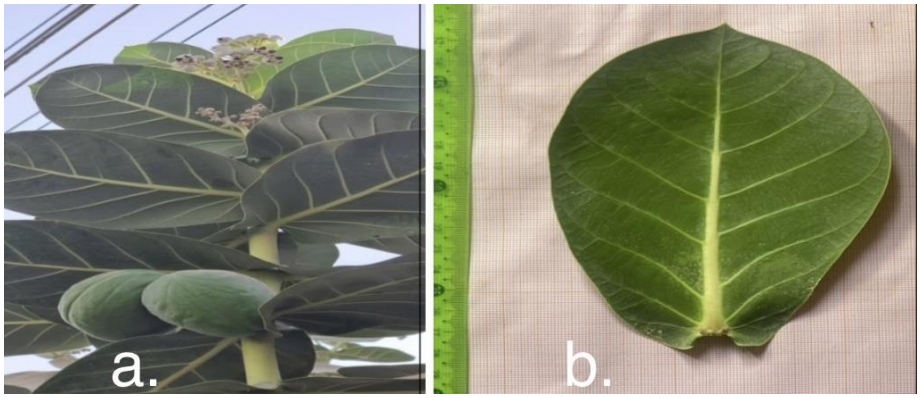

Figure 2: *C. procera* [a - branches arranged opposite; b - broadly ovate veined leaf]

A vertical section thru the midrib suggests the higher and lower dermis as a monolayer, externally included with a thick striated cuticle, parenchyma and parenchyma cells of equal diameter to round. The intracellular space exists in the ground tissue and consists of bicol lateral and open vascular bundles. The xylem is mainly composed of blood vessels and tracheid's. In addition to the phloem and area, blood vessels are also present. The leaves located at the mesophyll differentiate into palisade and spongy tissue. The outer upper and lower epidermis are covered with a thick striated stratum corneum. Below the upper epidermis are three rows of slender, densely arranged palisade parenchyma. The spongy parenchyma is almost radially elongated with intracellular spaces. Central cells are irregularly shaped; vascular bundles are also interspersed in this area; details are shown in Figure 3.

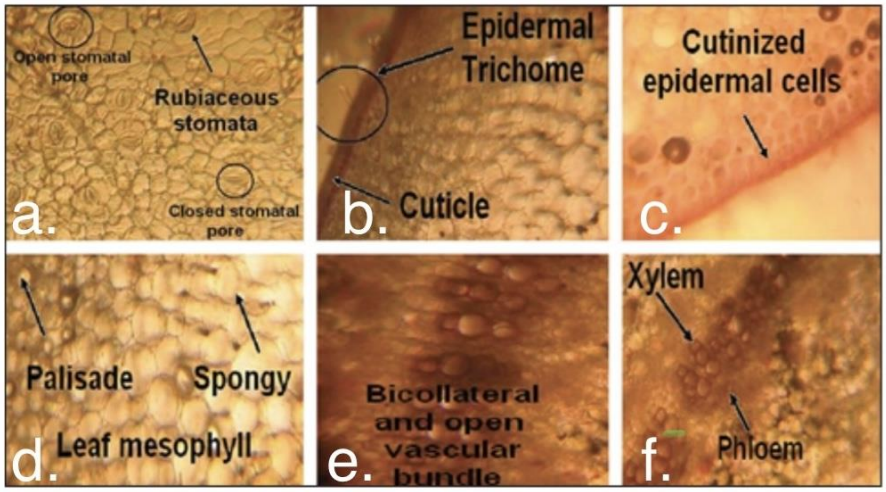

Figure 3: Microscopic *C. procera* [a. b. c. Leaf; d. Root; e. f. Stem]

Flowers more or less five-lobed, 2-3 cm in diameter, excluding milky sap. They are white with a dark purple spot on the tip of each lobe and dark purple scales between the petals and the stamens. The flowers are in racemose umbels, see Figure 4 for details.

Figure 4: *C. procera flawer*

The fruit is a grey-green pod, 8-12 cm long. They are rounded at the bottom but point briefly at the tip. Each fruit contains hundreds of brown, flat seeds with a tuft of white hairs 2-3 cm long at one end. Seed weight 5.9-7 mg; see Figure 5 for details.

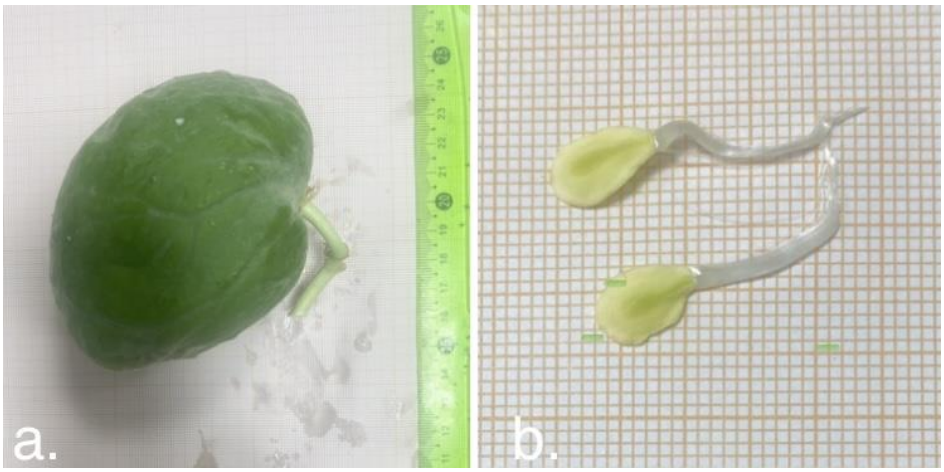

Figure 5: Morphology of *C. procera* [a-Fruits; b- Seeds]

Discussion and Conclusion:

This study highlights the results of a comprehensive study of the morphological and microscopic parameters of *C. procera*, including cellular composition, tissue organization, and cellular inclusions in roots, stems, and leaves. Leaves on the dorsal side of the mesophyll differentiate into palisade and spongy tissue.

The outer upper and lower epidermis are covered with a thick striated stratum. Below the upper epidermis are three rows of slender, tightly packed palisade parenchyma [17]. The spongy parenchyma is almost radially elongated with intracellular spaces. The central cells are irregularly shaped; this area is also interspersed with vacuoles and vascular bundles.

The outcomes of the current study showed the morphological description and traits of essential components in *C. Procera* plant. Future studies of *C. procera* from other phytogeographic regions of the world are needed to expand our knowledge of the species' distribution and polymorphism and how it responds to global climate change and adapts to local ecological factors.

This plant is of great medical importance. We recommend studying it and benefiting from it. At the same time, we recommend caution while dealing with this plant, as it considered a poisonous and dangerous plant, especially the milky juice found in its stem and leaves.

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